

A NEW ISOPOD FROM CENTRAL AUSTRALIA BELONGING  
TO THE PHREATOICIDAE.

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(Communicated by Professor F. Wood Jones).

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In this paper I describe a new and most interesting fresh-water Isopod kindly sent to me by Professor F. Wood Jones, of Adelaide University. It was collected in June, 1920, in artesian water from the Hergott (Marree) bore, in Central Australia, a little south of Lake Eyre.

The animal proves to belong to the Phreatoicidae and comes sufficiently near the typical genus *Phreatoicus* to be placed in it. The Phreatoicidae is a family of fresh-water Isopods of which the first member was described in 1883, from the underground waters of the Canterbury Plains in New Zealand. Later on other species of the genus, and of closely allied genera, were described from the surface and underground waters of Australia, and, still more recently, Barnard (1914, p. 231) recorded a species of *Phreatoicus* from the mountain streams of Cape Colony, South Africa. The family is quite distinct from all the other families of the Isopoda, and forms, by itself, the sub-order Phreatoicidae, marked by some primitive characters and by a striking but superficial resemblance to the Amphipoda. The characters and distribution showed that the family must be an ancient one, and in 1918 this was proved by the discovery of a fossil species from the Triassic beds of New South Wales. The fossil form is not very different from some of the existing species, and, apparently, members of the family have been living in fresh waters on some part of the Australian continent from Triassic times up to the present. The discovery of another quite distinct species in Central Australia is most interesting and important as confirming the conclusions already arrived at. Further details of the history of the family will be found in my paper describing the fossil species (Proc. Roy. Soc. N.S. Wales, vol. 51, p. 383).

The mode of occurrence of the new species is worthy of note. In his first letter, Professor Wood Jones said:—"Hergott is a pure artesian bore; the water is hot, and the creatures were in thousands swimming in the hot water near the bore head." The specimens sent were found to possess well-developed eyes and to be of a dark-slaty colour, so that

they evidently had not come up the bore from underground waters. On my pointing this out and asking for further particulars, Professor Wood Jones wrote:—"Now I have asked everyone who knows, and I am assured that all the water is bore water pure and simple. . . At Hergott there are natural springs—that is why the place sprang into existence. I have never seen the springs; they are some three miles away from the place where the bore was sunk. . . . The bore is just on the desert—the water flows on the desert where previously no water was (there is no old watercourse into which the bore water has found its way, as at Clayton and Dulcanina)." It is no wonder, therefore, that it is the popular belief that the animals came up the bore, for this is, as Professor Wood Jones says, "the local story of all bore-water fauna." He adds that it is curious that though every party that has gone into the centre of Australia has based on Hergott, no one has noticed or collected the Isopod, although the hot water of the bore is full of them. When he was there they were in countless numbers, all swimming against the hot current. He did not take the temperature of the water, but says, "It is very hot; steam arising from it."

Like other Isopods, the *Phreatoicus* carries its eggs in a brood pouch underneath the body till the young are hatched out and, probably, for some time longer, the young then being similar in form to the adults. It is, therefore, a little difficult to see how they have got from the spring, or other natural water from which they must have come, to the bore water in which they exist in such numbers. It is, of course, possible that when the natural water dries up they become encased in the dried-up mud, retaining the power of vitality and resuming activity as soon as the water reappears, but that does not explain how they have got from the natural springs, situated near Marree, to the bore water, three miles distant. It is, however, clear that they must be widely distributed and abundant in springs and natural waters in the district, for Professor Wood Jones, in a letter dated October 5, 1921, states that in a recent trip he collected specimens from the mound springs, near Coward, just to the westward of Lake Eyre south. There are, he says, many of these springs, and they vary greatly in salinity and temperature, but the animal was found in all the springs, from Bullakaninna to Coward, an area of some 30 miles.

In this connection it is worthy of note that another member of the family, *Phreatoicopsis terricola*, Spencer and Hall, was found in burrows on the banks of the Upper Gellibrand River (Spencer and Hall, 1896, p. 13). This species has since been recorded from the Otway forest; from Mount William,

near Ararat; and from the Grampians (Raff, 1912, p. 70). Another species, *Hypsimetopus intrusor*, Sayce, occurs in the burrows of the land crayfish, *Engaeus cunicularius*, in Tasmania (Sayce, 1902, p. 218). The remaining species of the family appear to be genuinely aquatic, being found in surface or underground fresh-water streams.

Although the species under consideration is being placed for the present under the genus *Phreatoicus*, it differs from the other members of the genus in at least two characters. The more evident of these, though not the more important, is the greater expansion of the basal joints of the last three pairs of peraeopoda, as shown in figs. 1 and 10. In the other species of the genus these joints are comparatively narrow, as in most Isopods<sup>(1)</sup>; but in the present species the expansion is fully as great as that in most Amphipoda, and still further increases the resemblance to an Amphipod, caused from the laterally compressed form of the body. It may be mentioned, however, that the next joint, the ischium, is comparatively long—longer than the succeeding joint, the merus—while, as I have elsewhere pointed out (1894, p. 205), in Amphipoda, with broadened basal joints, the ischium is usually quite short.

The other point of difference, though less evident, is of more real importance, *viz.*, the apparent absence of the coxal joints of all the peraeopoda. In other species this coxal joint, though small, is quite well marked and can be readily recognized as the first joint of the limb, for it is not flattened into a side plate or "epimeron," as it is in most Amphipoda. In *P. latipes* the pleura of the first four segments are produced downwards and outwards so as to hide the base of the leg, and even when the attachment of the limb to the inner side of the pleuron is examined, nothing is seen that can be definitely recognized as the coxal joint. Consequently it must either have become fused with the pleuron, but if so without any suture or mark indicating its presence, or it is quite absent. Calman (1909, p. 202) has some interesting remarks on the development of the coxal joint of the peraeopoda in various Isopods, and gives examples in which it appears to replace the pleural expansion of the segment, though, in that case, it is marked off from the segment on the dorsal surface by a distinct suture, except in the first segment, where there is no suture, and in some of the Oniscoidea in which the suture on the other segments also may disappear.

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(1) The basal joints are slightly broadened in *Phreatoicus australis*.

The species of *Phreatoicus* now under consideration may be described as follows:—

PHREATOICUS LATIPES, n. sp.

Figs. 1-14.

*Specific diagnosis.*—Body stout. Peraeon (fig. 2) broad, not laterally compressed, moderately convex with the pleural portion of the first four segments projecting outwards and slightly downwards so as to conceal the basal joints of the legs. Pleon short, about half the combined length of the cephalon and peraeon, moderately compressed laterally, pleural portions of the segments produced downwards, their lower margins being rounded and fringed with a few setae. First segment of peraeon short and immovably joined with the head but with the suture well marked, pleural portion of segment free and produced anteriorly about half-way along the lower margin of the head, those of the second and third segments less produced anteriorly. Eye well developed, irregularly rounded or subtriangular, black. Surface of the body covered with small scattered setae, nearly smooth but with slight wrinkles or irregularities on most of the segments. Sixth segment of peraeon united with the terminal segment, or telson, but distinctly marked off from it by a well-defined suture running obliquely backwards from the upper pleural portion of the fifth segment to the base of the uropod (fig. 4). Terminal segment strongly arched above, sides widely separate below, the mid-dorsal end portion showing as a slight process in side view and when seen from above having a median indentation between two rounded lobes, each of which bears three or four setules. (Fig. 3.)

First antenna more than half the length of the second, joints of the flagellum not broadened. Second antenna nearly as long as the head and first two segments of the peraeon.

The mouth parts do not differ greatly from those of *Phreatoicus australis*. In the mandibles the palp is rather short, the third joint being quite short and bent at right angles to the second. There are two strongly chitinized cutting edges in the left mandible; in the right the inner one is small and colourless, as in *P. capensis*. The first maxilla has about six plumose setae at the apex of the inner lobe. In the second maxilla the two outer lobes are very slender, bearing long pectinate setae; the inner lobe is broader and rounded, densely setose, and fringed along its inner margin with a very regular and distinct row of long setae. In the maxilliped, the epipod is nearly circular, thin; the second joint bears a very distinct row of plumose setae projecting inwards towards the mouth cavity; the palp is of the usual structure.

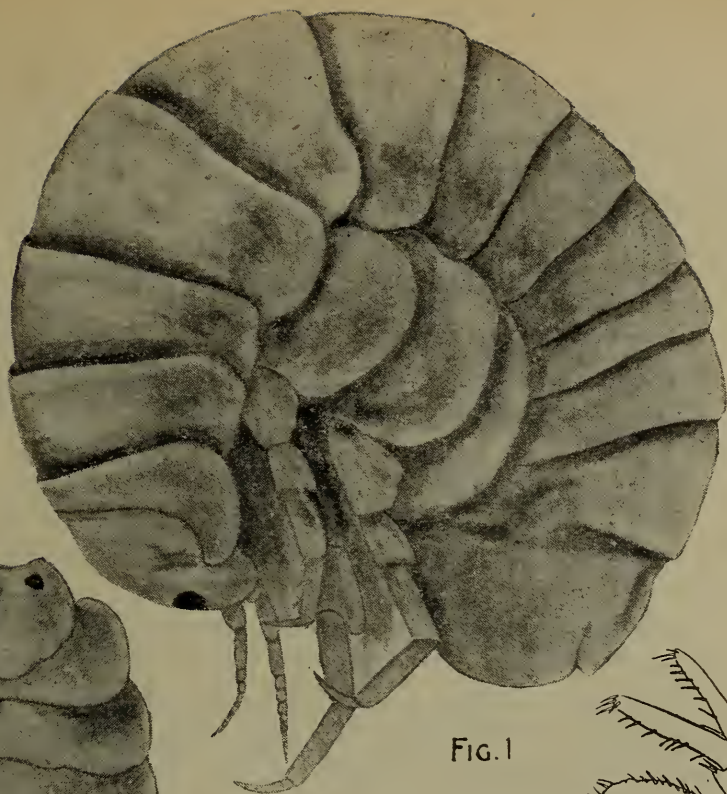


FIG. 1



FIG. 2



FIG. 3



FIG 4

All the figures refer to *Phreatoicus latipes* and are taken from a male specimen.

- Fig. 1. Side view of the whole animal.
- „ 2. Dorsal view of body.
- „ 3. Dorsal view of end portion of terminal segment.
- „ 4. Side view of pleon, straightened out to show the anterior segments more clearly.

First pair of legs strongly subchelate; second and third similar to one another, feebly subchelate; fourth pair more slender and not specially modified in the male; fifth, sixth, and seventh pairs increasing progressively in length, their basal joints flat and greatly produced posteriorly into a rounded lobe similar to that in many Amphipoda, the lobe marked off from the joint proper by a distinct ridge, posterior margin of the lobe entire (fig. 10).

Uropods short, not projecting much beyond the end of the terminal segment, outer branch slightly shorter than the inner.

*Colour*.—Dark slaty-grey. In some young specimens the surface of the body is lighter in colour with dark pigmented spots much more widely separated from one another than in the adult.

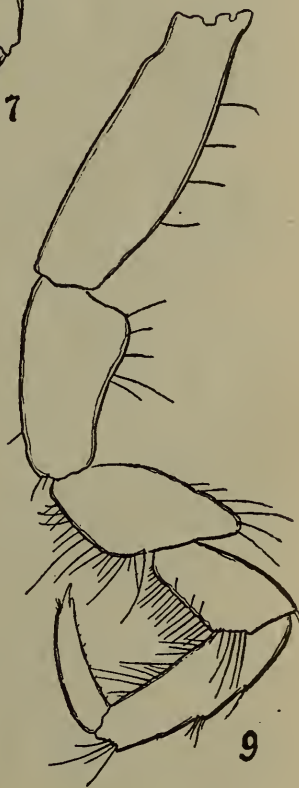
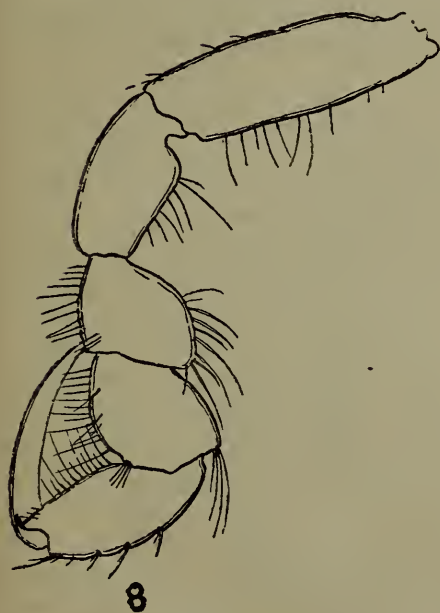
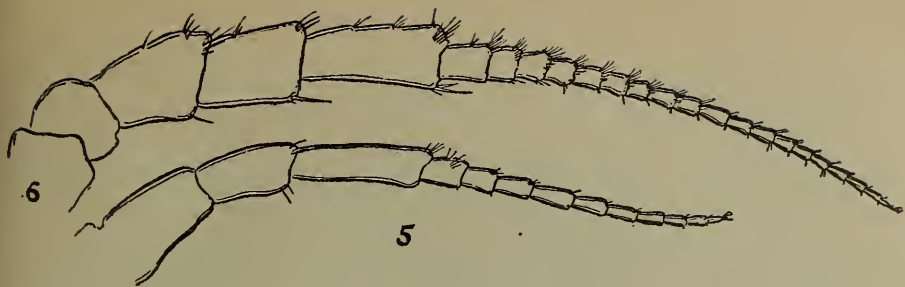
Length of body (in curved position), about 15 mm. Greatest breadth of peraeon, about 6.5 mm.

*Locality*.—In hot water from Marree (Hergott) bore, and in springs and streams near Coward, Central Australia. Collected by Professor F. Wood Jones, Adelaide University.

*Remarks*.—Although in the flattened character of the peraeon and the greatly broadened basal joints of the last three pairs of legs this species differs markedly from other species of *Phreatoicus*, there seems to be a fairly close resemblance in the various appendages, so that it will not be necessary to give a very detailed account of these.

The first antenna (fig. 5) is slender, the first and third joints of the peduncle similar and considerably longer than the second; the flagellum is about the same length as the peduncle and contains about ten joints, which bear short simple setae and a few olfactory setae. The second antenna (fig. 6) is considerably longer and stouter than the first; the first two joints of the peduncle are short, the third about twice as long as the second and subequal with the fourth, the fifth longer and more slender; the flagellum is subequal in length with the peduncle and contains about nineteen joints, the basal ones being somewhat stout and bearing tufts of numerous short simple setae.

In the male the legs of the first pair (fig. 7) are strongly subchelate, the propod being subtriangular and greatly broadened at the base, the finger not reaching beyond the straight palm. In general appearance this appendage is similar to that of *P. australis*. The second and third pairs of legs (fig. 8) are similar, longer, and more slender than the



All the figures refer to *Phreatoicus latipes* and are taken from a male specimen.

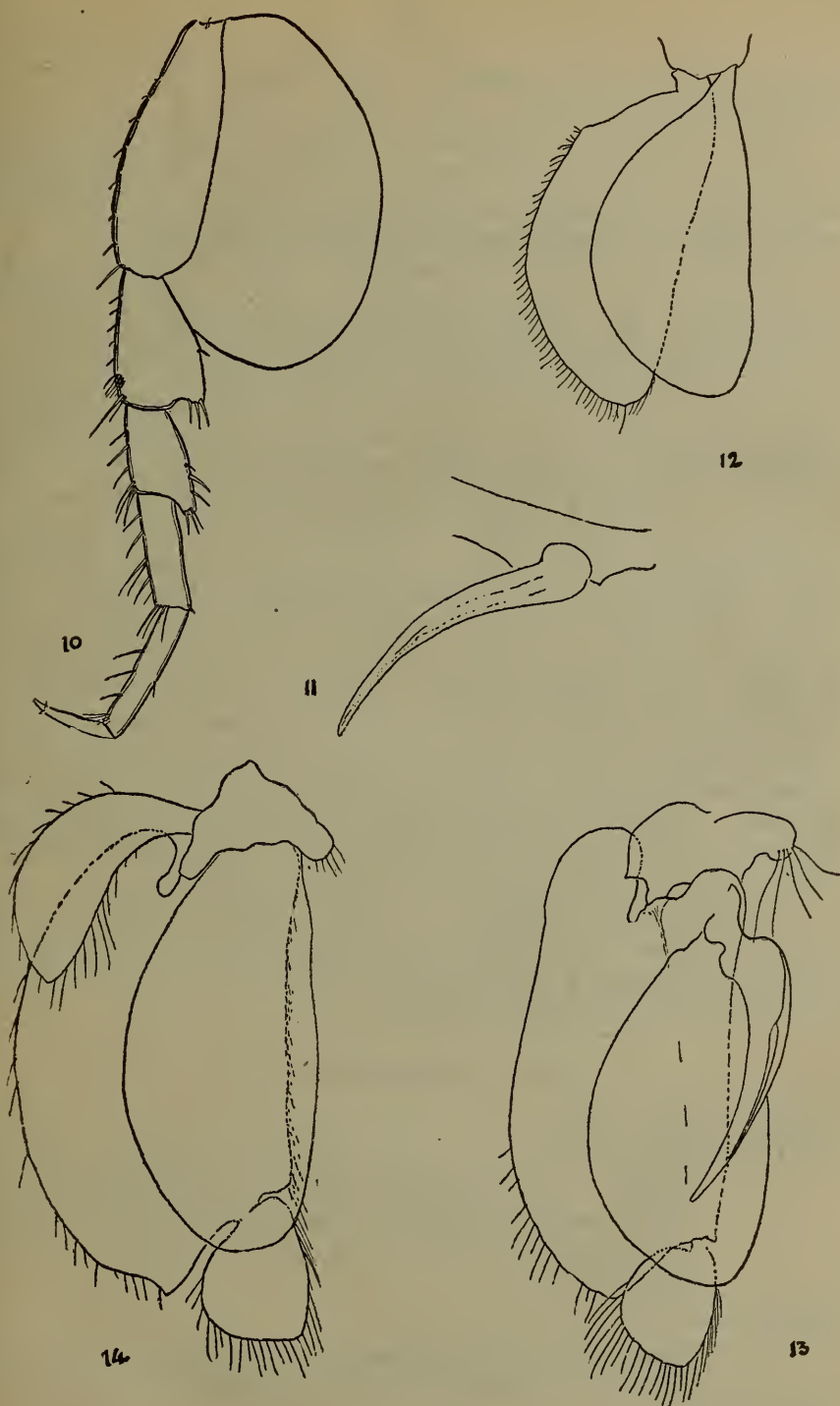
- Fig. 5. First antenna.  
 „ 6. Second antenna.  
 „ 7. First peraeopod.  
 „ 8. Third peraeopod.  
 „ 9. Fourth peraeopod.

first; the propod is not broadened, but the finger is very long, slightly curved, and when flexed reaches back as far as the basal portion of the carpus, forming apparently an efficient grasping organ. The fourth leg (fig. 9) is slightly longer than the third with the joints more slender, and it is not subchelate but simple, the finger not longer than the propod. This appendage is the same in both male and female, although in some other species of *Phreatoicus* the legs of the fourth pair are modified in the male to form a special grasping organ. The fifth, sixth, and seventh pairs are quite similar, increasing progressively in length posteriorly. The basal joint in each is very greatly expanded behind into a rounded lobe projecting backwards and downwards, reaching two-thirds of the way to the distal end of the ischium. This expansion is marked off from the joint proper by a distinct ridge running parallel to the anterior margin; the posterior margin of the lobe is entire and bears no setae; the ischium is distinctly longer than the merus and, like it, broadened somewhat distally; the carpus and propod are cylindrical; the finger is straight, acute; these joints show setae of varying sizes, as indicated in the figure (fig. 10).

The male appendages (fig. 11) on the seventh peraeon segment are slender, tapering, curved inwards towards one another, slightly swollen at the base, and apparently grooved on the posterior surface.

The pleopods show a close general resemblance to those of *P. australis*. The first pleopod has the basal joint or protopod short, the endopod and exopod subequal, each forming an irregular oval lobe, the margin of the endopod being smooth and without setae, as in all the pleopods, the outer margin and apex of the exopod being fringed with fine setae. The second pleopod in the male (fig. 13) has the basal joint broader and bearing a few long setae at its inner margin; the endopod is similar to that of the first pleopod, but bears on the inner side the penial appendage, which is four-fifths as long as the exopod, broadened near the base and apparently grooved on its upper or anterior surface; the exopod is larger than the endopod and consists of two joints, the basal one about as long as the endopod and produced at its outer proximal angle into a broad rounded lobe; the terminal joint is small, oval, and has its margins fringed with long setae, a few long setae being also present on the distal portion of the outer margin of the basal joint. The third (fig. 14), fourth, and fifth pleopods are similar to the second, except for the absence of the penial appendage, and they all bear attached to the outer margin of the basal joint a large





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- Fig. 10. Seventh peraeopod (less highly magnified than  
 figs. 7, 8, and 9).  
 ,, 11. Male appendage.  
 ,, 12. First pleopod of male.  
 ,, 13. Second pleopod of male.  
 ,, 14. Third pleopod of male.

well-developed oval "epipod," the margins of which are fringed with long setae.

The uropods are similar to those of other species of *Phreatoicus*, having the basal joint subequal in length with the branches, its upper margin fringed with stout setae, the upper margin of each branch being similarly fringed.

*Affinities.*—Until it is possible to make a revision of the Phreatoicidea this species may be left under the genus *Phreatoicus*. It shows a good general resemblance to *P. australis*, but differs markedly from that species, and indeed from all the members of the tribe, in the absence of the coxal joints of the peraeopoda. It resembles *P. australis* in having the first peraeon segment short and more or less fused with the head, in this character agreeing also with *Phreatoicopsis terricola*, Spencer and Hall. It agrees with the latter species and differs from *Phreatoicus australis* in the fact that the fourth peraeopod is not specially modified in the male. The sixth segment of the pleon, although fused with the terminal segment, or telson, appears to be more distinctly marked off from it by a distinct suture than in the other species; in *Phreatoicus australis* there is a suture present, but this extends anteriorly only a short distance from the base of the uropod and does not reach the posterior margin of the fifth segment. In most Isopods, except the Anthuridae, the sixth segment is completely fused with the telson without any apparent suture to indicate the line of juncture.

I am greatly indebted to my assistant, Miss E. M. Herriott, M.A., for preparing the drawings for this paper, and to Professor F. Wood Jones for the opportunity of describing this interesting species.

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